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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/996,176	11/27/2001	Evan R. Green	42390P10393	2243

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EXAMINER

WILLIAMS, HOWARD L

ART UNIT PAPER NUMBER

2819

DATE MAILED: 02/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/996,176

Applicant(s)

Green

Examiner

Howard L. Williams

Art Unit

2819

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 16 Dec. 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 6-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

A shortened statutory period for reply to this action is set to expire THREE MONTHS from the mailing date of this action. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

*A person shall be entitled to a patent unless –*  
*(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.*  
*(e) the invention was described in-*  
*(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or*  
*(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).*

Claims 6, 7, 12-15 and 18-20 are rejected under 35 U.S.C. 102(e) as anticipated by Vareljian (US 6,480,532 B1). Vareljian discloses with regards to figure 4 a transmit path including a digital-to-analog converter 118, a receive path including analog-to-digital converter and cancellation circuitry (130, 116', 118', 120' and 122') which supplies a signal to analog subtraction (128) to mitigate the interference.

Claims 12-15 and 18-20 are rejected under 35 U.S.C. 102(b) as anticipated by Marcos et al. (US 4,891,801).

Marcos et al. discloses cancellation of an interfering signal caused by echo. With reference to figure 8, the transmitter path (3,5;fig. 8) (Marcos et al.

call it the emissive path) converts a digital to analog transmit signal (58; fig. 2) and includes a digital-to-analog converter (58; fig. 2 again), the receive path includes an analog-to-digital converter to convert the analog receive signal to digital, interference cancellation is provided by the echo canceller (7b; fig. 8) in conjunction with the subtraction element (73; fig. 8). The output of the analog subtractor is coupled to the analog-to-digital converter. The adaptive filter processes a digital version of the transmit signal and receive signal and supplies a canceling signal to the analog subtractor to mitigate interference. Marcos further notes that previous methods moving the input of the echo cancellation circuit further back in the digital domain (col. 4, lines 10-15).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.*

Claims 6-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith (US 5,444,864) in view of Kenworthy (US 5,691,978).

Smith discloses a system for active cancellation of interference in RF systems. Smith notes that it is well known to arrange RF system to either make use of the same antenna or separate transmit and receive antennas in close proximity to each other. (col. 1 lines 16-23). The Smith interference cancellation arrangement samples a portion of the transmit signal (28; fig. 1) and receive signal 32 and supplies each of these signals to signal processing circuit (12; fig. 1) to provide a gain and phase matched signal to the coupled or leak-through interference signal. The gain and phase matched signal (36; fig. 1) is fed to one input of a subtraction circuit to substantially cancel the interference signal in the receive path. Smith does not disclose analog-to-digital converters in the transmit

path nor digital-to-analog converters in the receive path with digital signals being the signals being the input the adaptive cancellation circuit.

Kenworthy discloses an RF communication systems which uses antenna positioning, RF cancellation and adaptive cancellation at the baseband frequency to mitigate coupled and reflected interference from the desired RF signal of interest in the receive path. The adaptive baseband cancellation taps digital signals from the transmit path (fig. 3) --the converters are noted as optional or if necessary -- for gain and phase matching a portion of the transmit signal in a processing circuit (43; fig. 3) for coupled and reflected interference cancellation in the receive path. The optional and if necessary nature of the converters for the cancellation signal and receive path further demonstrate that digital transceiver circuitry is known and the use of digital processing for its respective benefits over analog processing are well known and would have been obvious.

Smith and Kenworthy do not disclose their RF system as including IEEE 802.11(b) or 815.1 "Bluetooth" standards transmission. However, the application of known interference cancellation to relatively new RF spectrum that does nothing to change the technique would have been obvious to one of skill in the art because the issue of cross coupling in systems having co-located antennas would still exist.

Claims 8-11, 16, 17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vareljian (US 6,480,532 B1) in view of Smith (US 5,444,864) Kenworthy (US 5,691,978). Vareljian does not disclose the antennas and their orthogonal placement. Smith discloses leak-through and antenna coupling in hybrids or diplexers for shared antenna system or two antenna (transmit and receive antennas) system and Kenworthy discloses positioning of the antennas to achieve some reduction of the unwanted signal. It would have been obvious to combine the teachings of these references to provide the claimed interference cancellation arrangement as these issues have been known and substantially

mitigated in system with other transmission standards and shifting to a different band and format does not change the problem nor the solution.


Claims 6-11, 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marcos et al. (US 4,891,801) in view of Dankberg et al. (US 5,596,439) and Kenworthy (US 5,691,978). Marcos et al. primarily focuses upon echoes in telephone interface circuitry and thus does not disclose the two antennas. Dankberg et al. discloses the similar nature of the echo signal and interference signals appearing in co-located antennas. Dankberg et al. also discloses that the interference canceller can be implemented either largely with digital components or largely with analog components and that the specific make-up is a choice. It would have been obvious from Marcos et al. and Dankberg et al. to arrive at the claimed digital inputs for the cancellation circuitry and provide as an output therefrom an out-of phase signal to mitigate interference in the receiver path. Tahara (US 4,857,858) discloses active cancellation in digital radio transmission incorporating orthogonally positioned channels. It is well known from antenna study that the orientation or placement of an antenna affects reception of certain signals and accordingly would have been obvious to use antenna placement to achieve further reduction of undesirable signals.

Applicant's arguments filed 16 December 2002 have been fully considered and are not persuasive. The response argues that Kenworthy does not show the D/A converter as claimed. It was pointed out that Kenworthy does disclose the A/D converters shown in the implementation of the digital adaptive baseband filter as "if necessary." This condition suggests --the filter is plainly disclosed as digital-- that the signal from the transmit path may be digital. Kenworthy also shows plainly analog components between the antenna(s) and

the filter further suggesting that analog to digital or digital to analog conversion be used as appropriate. The response additionally latches on the phrase about the signal E in Kenworthy being minimised to urge that the receive signal is already clean of transmit interference and thus Kenworthy is not applicable. The output of the subtractor is labeled E not the output of the FIR filter as shown in Kenworthy figure 3. Thus the FIR filter attempts to minimize the interference E in the output of the subtractor such that only the desired signal. The response seems to miscast the operation of the baseband canceller.

Any inquiry concerning this communication should be directed to Howard L. Williams at telephone number 703-308-1679.

13 February 2003

  
Howard L. Williams  
Primary Examiner  
Art Unit 2819